WHAT IS CLAIMED IS:

1. A heat treatment apparatus comprising:

a reaction chamber;

means for supplying a gas from an upstream side of the reaction chamber;

means for heating the gas on the upstream side of the reaction chamber;

means for holding a substrate to be processed on a downstream side of the reaction chamber; and

means for circulating the gas from the downstream side of the reaction chamber to the upstream side of the reaction chamber.

2. An apparatus according to claim 1, wherein said means for heating comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

3. An apparatus according to claim 1, wherein said gas is selected from nitrogen and rare gases.

4. An apparatus according to claim 1, wherein said gas is one of reducing gases.

5. An apparatus according to claim 1, wherein said gas is one of oxidizing gases.

6. A heat treatment apparatus comprising:

a reaction chamber;

means for supplying a gas from an upstream side of the reaction chamber;

heat generating means formed on the upstream side of the reaction chamber;

at least one heat absorber for absorbing thermal radiation from the heat generating means;

means for holding a substrate to be processed on a downstream side of the reaction chamber; and

circulation means for supplying the gas from the downstream side of the reaction chamber to the upstream side of the reaction chamber.

7. An apparatus according to claim 6, wherein said means for heating comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

8. An apparatus according to claim 6, wherein said gas is selected from nitrogen and rare gases.

9. An apparatus according to claim 6, wherein said gas is one of reducing gases.

10. An apparatus according to claim 6, wherein said gas is one of oxidizing

gases.

11. A heat treatment apparatus comprising:

a reaction chamber having an intake portion for inhaling a gas, and an exhaust portion for expelling the inhaled gas;

heat treatment means for heating the inhaled gas in the reaction chamber;

means for supplying the gas, heated by the heat treatment means, to a substrate to be processed that is disposed within the reaction chamber; and

means for circulating the gas expelled from the exhaust portion to the intake portion.

12. An apparatus according to claim 11, wherein said heat treatment means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

13. An apparatus according to claim 11, wherein said gas is selected from nitrogen and rare gases.

14. An apparatus according to claim 11, wherein said gas is one of reducing gases.

15. An apparatus according to claim 11, wherein said gas is one of oxidizing gases.

16. A heat treatment apparatus comprising:

a reaction chamber having an intake portion for inhaling a gas, and an exhaust portion for expelling the inhaled gas;

heat generating means for heating the inhaled gas in the reaction chamber;

heat treatment means having a heat absorber for absorbing thermal radiation from the heat generating means;

means for supplying the gas, heated by the heat treatment means, to a substrate to be processed that is disposed within the reaction chamber; and

means for circulating the gas expelled from the exhaust portion to the intake portion.

17. An apparatus according to claim 16, wherein said heat generating means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

18. An apparatus according to claim 16, wherein said gas is selected from nitrogen and rare gases.

19. An apparatus according to claim 16, wherein said gas is one of reducing gases.

20. An apparatus according to claim 16, wherein said gas is one of oxidizing gases.

21. A heat treatment apparatus comprising:

a reaction chamber;

means for supplying a gas from an upstream side of the reaction chamber, through a heat exchanger;

means for heating the gas on the upstream side of the reaction chamber;

means for holding a substrate to be processed on a downstream side of the reaction chamber; and

means for supplying the gas from the downstream side of the reaction chamber to the heat exchanger.

22. An apparatus according to claim 21, wherein said means for heating comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

23. An apparatus according to claim 21, wherein said gas is selected from nitrogen and rare gases.

24. An apparatus according to claim 21, wherein said gas is one of reducing gases.

25. An apparatus according to claim 21, wherein said gas is one of oxidizing gases.

26. A heat treatment apparatus comprising:

a reaction chamber having an intake portion for inhaling a gas, and an exhaust portion for expelling the inhaled gas;

a heat exchanger formed on an upstream side of the intake portion;

means for supplying the gas through the heat exchanger;

heat treatment means for heating the inhaled gas in the reaction chamber;

means for supplying the gas, heated by the heat treatment means, to a substrate to be processed that is disposed within the reaction chamber; and

means for supplying the gas expelled from the exhaust portion to the heat exchanger.

27. An apparatus according to claim 26, wherein said heat generating means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

28. An apparatus according to claim 26, wherein said gas is selected from nitrogen and rare gases.

29. An apparatus according to claim 26, wherein said gas is one of reducing gases.

30. An apparatus according to claim 26, wherein said gas is one of oxidizing gases.

31. A heat treatment apparatus comprising:

gas supply means;

a heat exchanger;

first gas heat treatment means having an entrance port and an exhaust port;

a first processing chamber having an entrance port and an exhaust port;

second gas heat treatment means having an entrance port and an exhaust port; and

a second processing chamber having an entrance port and an exhaust port;

wherein:

the gas supply means is connected to the entrance port of the first gas heat treatment means, through the heat exchanger;

the entrance port of the first processing chamber is connected to the exhaust port of the first gas heat treatment means;

the exhaust port of the first processing chamber is connected to the entrance port of the second gas heat treatment means;

the entrance port of the second processing chamber is connected to the exhaust port of the second gas heat treatment means; and

the exhaust port of the second processing chamber is connected to the heat exchanger, and

wherein the heat treatment apparatus uses a gas heated by the heat treatment means as heat sources.

32. An apparatus according to claim 31, wherein each of said first and second

gas heat treatment means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

33. An apparatus according to claim 31, wherein said gas is selected from nitrogen and rare gases.

34. An apparatus according to claim 31, wherein said gas is one of reducing gases.

35. An apparatus according to claim 31, wherein said gas is one of oxidizing gases.

36. A heat treatment apparatus comprising:

n (where $n > 2$) processing chambers each having an entrance port and an exhaust port;

n gas heat treatment means each having an entrance port and an exhaust port; and

a heat exchanger;

wherein:

the entrance port of the m-th (where $1 \leq m \leq (n-1)$) processing chamber is connected to the exhaust port of the m-th gas heat treatment means;

the entrance port of the n-th processing chamber is connected to the exhaust port of the n-th gas heat treatment means; and

the exhaust port of the n-th processing chamber is connected to the heat

exchanger, and

wherein the heat treatment apparatus uses a gas heated by the heat treatment means as heat sources.

37. An apparatus according to claim 36, wherein each of said gas heat treatment means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

38. An apparatus according to claim 36, wherein said gas is selected from nitrogen and rare gases.

39. An apparatus according to claim 36, wherein said gas is one of reducing gases.

40. An apparatus according to claim 36, wherein said gas is one of oxidizing gases.

41. A heat treatment apparatus comprising:

first gas supply means;

second gas supply means;

a plurality of gas heat treatment means;

a plurality of processing chambers; and

piping;

wherein:

the first gas supply means is connected to the piping coupled in series to the plurality of processing chambers, through the gas heat treatment means; and

the second gas supply means is connected to the piping coupled in parallel to each of the plurality of processing chambers, and

wherein the heat treatment apparatus uses a gas heated by the heat treatment means as heat sources.

42. An apparatus according to claim 41, wherein each of said gas heat treatment means comprises at least one lamp selected from the group consisting of a halogen lamp, a metal halide lamp, a high pressure mercury lamp, a high pressure sodium lamp, and a xenon lamp.

43. An apparatus according to claim 41, wherein said gas is selected from nitrogen and rare gases.

44. An apparatus according to claim 41, wherein said gas is one of reducing gases.

45. An apparatus according to claim 41, wherein said gas is one of oxidizing gases.

46. A heat treatment method comprising the steps of:

supplying a gas from an upstream side of a reaction chamber;

heating the gas by using heat treatment means located on the upstream of the reaction chamber, and making the gas flow downstream; and

heating a substrate to be processed that is arranged on a downstream side of the reaction chamber while circulating the gas from the downstream side of the reaction chamber to the upstream side.

47. A method according to claim 46, wherein said gas is selected from nitrogen and rare gases.

48. A method according to claim 46, wherein said gas is one of reducing gases.

49. A method according to claim 46, wherein said gas is one of oxidizing gases.

50. A heat treatment method comprising the steps of:

supplying a gas from an upstream side of a reaction chamber;

heating the gas by using heat generating means, and a heat absorber for absorbing thermal radiation from the heat generating means, formed on the upstream side of the reaction chamber, and making the gas flow downstream;

again supplying the gas from the upstream side after the gas is expelled from a downstream side of the reaction chamber; and

heating a substrate to be processed that is held on the downstream side of the reaction chamber while it is being circulated.

51. A method according to claim 50, wherein said gas is selected from nitrogen and rare gases.

52. A method according to claim 50, wherein said gas is one of reducing gases.

53. A method according to claim 50, wherein said gas is one of oxidizing gases.

54. A heat treatment method comprising the steps of:

supplying a gas from an upstream side of a reaction chamber;

heating the gas by using heat generating means, and a heat absorber for absorbing thermal radiation from the heat generating means, formed in the upstream side of the reaction chamber, and making the gas flow downstream;

supplying the gas expelled from an exhaust portion of the reaction chamber to an intake portion;

heating a substrate to be processed that is disposed in the reaction chamber by using the heated gas while it is being circulated.

55. A method according to claim 54, wherein said gas is selected from nitrogen and rare gases.

56. A method according to claim 54, wherein said gas is one of reducing gases.

57. A method according to claim 54, wherein said gas is one of oxidizing gases.

58. A heat treatment method comprising the steps of:

disposing a substrate in a processing chamber;

supplying a gas from gas supply means to first gas heat treatment means, through a heat exchanger;

heating the gas by using the first gas heat treatment means;

supplying the heated gas to a first processing chamber;

heating the gas expelled from the first processing chamber by using second gas heat treatment means;

supplying the heated gas to a second processing chamber; and

supplying the gas expelled from the second processing chamber to the heat exchanger.

59. A method according to claim 58, wherein said gas is selected from nitrogen and rare gases.

60. A method according to claim 58, wherein said gas is one of reducing gases.

61. A method according to claim 58, wherein said gas is one of oxidizing gases.

62. A method of heat treating using n (where $n > 2$) processing chambers and n gas heat treatment means, comprising the steps of:

disposing a substrate in a processing chamber;

supplying a gas heated by the m-th (where $1 \leq m \leq (n-1)$) gas heat

treatment means to the m-th processing chamber;

heating the gas supplied to the m-th processing chamber by using the (m+1)-th heat treatment means, and supplying the heated gas to the (m+1)-th processing chamber;

supplying the gas supplied to the n-th processing chamber to a heat exchanger; and

heating the substrate disposed in the n-th processing chamber by using the gas supplied from gas supply means as a heat source.

63. A method according to claim 62, wherein said gas is selected from nitrogen and rare gases.

64. A method according to claim 62, wherein said gas is one of reducing gases.

65. A method according to claim 62, wherein said gas is one of oxidizing gases.

66. A heat treatment method comprising the steps of:

disposing a substrate in a processing chamber;

supplying a gas from first gas supply means to first gas heat treatment means, through a heat exchanger;

heating the gas by using the first gas heat treatment means;

supplying the heated gas to a first processing chamber;

heating the gas expelled from the first processing chamber by using second

gas heat treatment means;

a heat treatment period for supplying the heated gas to a second processing chamber;

supplying the gas from second gas supply means to the first processing chamber and to the second processing chamber, without going through the heat treatment means; and

a cooling period for cooling the substrate disposed in the processing chamber.

67. A method according to claim 66, wherein said gas is selected from nitrogen and rare gases.

68. A method according to claim 66, wherein said gas is one of reducing gases.

69. A method according to claim 66, wherein said gas is one of oxidizing gases.

70. A method of heat treating using n (where $n > 2$) processing chambers and n gas heat treatment means, comprising the steps of:

disposing a substrate in a processing chamber;

supplying a gas supplied from first gas supply means and heated by the m-th (where $1 \leq m \leq (n-1)$) heat treatment means to the m-th processing chamber;

heating the gas supplied to the m-th processing chamber by using the (m+1)-th heat treatment means, and supplying the heated gas to the (m+1)-th

processing chamber;

supplying the gas supplied to the n-th processing chamber to a heat exchanger;

a heat treatment period for heating the substrate disposed in the n-th processing chamber, using the gas supplied from gas supply means as a heat source;

supplying a cooling gas from second gas supply means to the n-th processing chamber; and

a cooling period for cooling the substrate disposed in the n-th processing chamber.

71. A method according to claim 70, wherein said gas is selected from nitrogen and rare gases.

72. A method according to claim 70, wherein said gas is one of reducing gases.

73. A method according to claim 70, wherein said gas is one of oxidizing gases.